CS225 Final Project Goal

Openflights: Find preferred (shortest) route between two recorded airports with possible routes given.

General Dataset: https://openflights.org/data.html

Specific Data that we are using:

Airports Data: https://raw.githubusercontent.com/jpatokal/openflights/master/data/airports.dat
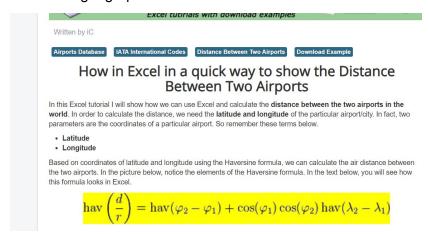**Routes Data**: https://raw.githubusercontent.com/jpatokal/openflights/master/data/routes.dat

Airports data is of the format **Airport ID, Name, City, Country, IATA, ICAO, Latitude, Longitude, Altitude, Timezone, DST, Tz database time zone, Type, Source.**
Routes data is of the format **Airline, Airline ID, Source airport, Source airport ID, Codeshare, Stops, Equipment.**

Workflow:

1. Read data into favorable data structure
2. Distance between geographical distance

   Excel tutorials with download examples

   Written by iC

   [Airports Database] [IATA International Codes] [Distance Between Two Airports] [Download Example]

   ## How in Excel in a quick way to show the Distance Between Two Airports

   In this Excel tutorial I will show how we can use Excel and calculate the **distance between the two airports in the world**. In order to calculate the distance, we need the **latitude and longitude** of the particular airport/city. In fact, two parameters are the coordinates of a particular airport. So remember these terms below.

   - Latitude
   - Longitude

   Based on coordinates of latitude and longitude using the Haversine formula, we can calculate the air distance between the two airports. In the picture below, notice the elements of the Haversine formula. In the text below, you will see how this formula looks in Excel.

   $$\mathrm{hav}\left(\frac{d}{r}\right) = \mathrm{hav}(\varphi_2 - \varphi_1) + \cos(\varphi_1)\cos(\varphi_2)\,\mathrm{hav}(\lambda_2 - \lambda_1)$$

   a.
      http://www.ic-ims.com/excel-examples-4/calculate-and-display-distance-between-two-airports.html
3. Transfer data into directed graph
   a. Each node represents an airport

      b.   Each route would connect two airport and it is not necessarily bi-directional

      c.   We may need to print it out

4. <mark>Traversal</mark>

      a.   BFS (Breadth First Search)

5. <mark>Dijkstra's Algorithm</mark>

      a.   Using shortest possible distance between starting point and ending point as weighting method (including transfer flights)

6. <mark>A* Search Algorithm</mark>

      a.   Finding the shortest possible path between two points when there are obstacles present in the whole graph, meaning that certain paths are blocked. In the airports and airline case, the obstacles would be certain airports that the passenger would want to avoid.

7. Implementation of Algorithm

8. The final presentation